



TITLE:

Environmental Consciousness in Japan
(<Special Issue>Environmental
Consciousness in Southeast and East Asia:
Comparative Studies of Public Perceptions
of Environmental Problems in Hong
Kong(China), Japan, Thailand, and Vietnam)

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CITATION:

Nickum, James E. ...[et al]. Environmental Consciousness in Japan (<Special Issue>Environmental Consciousness in Southeast and East Asia: Comparative Studies of Public Perceptions of Environmental Problems in Hong Kong(China), Japan, Thailand, a ...

ISSUE DATE:

2003-06

URL:

<http://hdl.handle.net/2433/53754>

RIGHT:

Environmental Consciousness in Japan

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Abstract

Through semi-structured interviews with 33 Japanese respondents, using a protocol adapted from Kempton *et al.*, we seek to limn the environmental consciousness of Japanese and compare it with that of Kempton's American sample. After exploring views on the environment in general, we use the salient, contested, and weakly understood issue of dioxin as a way of probing the cultural models of respondents. We find that national differences are minor in environmental discourse, and hypothesize that the most significant disparity, in acceptance of the precautionary principle, is related to a feeling of political and social powerlessness. Unlike in America, which may be the outlier, religious discourse does not explicitly enter into the presentation of environmental consciousness in Japan.

Keywords: environmental consciousness, Japan, cultural models, dioxin, discourse

Outsiders often regard another nation's people as holding paradoxical, even contradictory, attitudes towards nature and the environment. Thus, many Japanese see Americans as unilateralist and selfish towards global climate change because their government refuses to sign the Kyoto Protocol. Americans' opposition to whaling rings hollow to those who have read *Moby Dick* and remember America's Pacific expansion as being driven by the need to find ports for New England whalers. They are seen to espouse religious beliefs that justify a hegemonic attitude towards nature—and other peoples.

Similar finger-pointing is often directed at Japan's people. The land of Basho's exquisite nature haiku, celebrating the passing of the seasons, is also the land where rivers, beaches, and mountain slopes are liberally paved in concrete. The mountains that occupy 90 percent of Japan's land area are covered with trees, but primarily of two commercial species, left to grow and bring misery to millions with their pollen in the

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spring, while tropical forests elsewhere are depleted to satisfy the Japanese market.

Shallow interpretations of formal religious doctrine and interest group politics, both remote from everyday life, constitute a thin basis for assessing the environmental consciousness of a people, however. It is better to ask people directly. For this study, we interviewed 33 individuals in the Kanto area of Japan between February and April 1999. We interviewed a broad range of people, male and female, from college age to golden age, from lay people to environmental researchers, and from small shopkeepers and people between jobs to executives at some of Japan's largest corporations (Table 1).

In most cases, we carried out the interviews in teams of two. We used a semi-structured interview protocol adapted from that used by Willett Kempton and his

Table 1 Profiles of Respondents

	Pseudonym	Sex	Age	Educ	Birth	Occupation etc.
1	Iwakuni	M				professor; leading environmentalist
2	Minamoto	M	50	BA	Kanagawa	environmental director
3	Sato	M				
4	Takeuchi	M	42	PhD	Nishinomiya	professor
5	Kataoka	F	26	MA		environmental activist
6	Yamanaka	M	36	BA	Fujisawa	former derivative dealer
7	Yamada	F	36	College grad		tax accountant
8	Kita	M	23	MA 2nd	Ishikawa	student
9	Sawa	F	26	PhD 2nd	Tokyo	student
10	Waki	M	22	MA 1st	Tokyo	student
11	Yoshida	M	71	PhD 3rd	Harbin	retired banker
12	Aoyama	M	46	18 yrs	Aichi	manager at steel company
13	Hino	M	47	16 yrs	Saitama	vice-director at steel company
14	Mifune	M	na	na	na	director at steel company
15	Suzuki	M	22	BA	Tokyo	secretary for a member of the diet
16	Yamamoto	F	64	HS	Ishikawa	grocer
17	Watanabe	M	57	HS	Tokyo	dry cleaner
18	Kojima	F	63	HS	Ehime	housewife
19	Yasuda	M	40	BA	Tokyo	union activist
20	Hayashi	F	24	BA	Kanagawa	secretary
21	Asahi	M	30	BA	Kobe	newspaper deliverer; preparing for a state law examination
22	Mizuno	F	37	na	Aichi	housewife
23	Nohara	M	24	na	Akita	student
24	Nagano	F	24	14 yrs	Nagano	student
25	Iwasaki	F	25	MA	Shizuoka	unemployed
26	Shima	F	33	BA	Yokohama	business person
27	Abe	M	40s	na	na	retired farmer
28	Murakami	F	60s	na	na	farmer
29	Nishida	M	na	na	na	
30	Nishida	F	na	na	na	wife of Mr. Nishida
31	Yamagata	F	na	na	na	pregnant woman
32	Kosugi	M	45	PhD	Tokyo	researcher; chemistry
33	Kawate	M	44	PhD program	Fukuoka	researcher, chemistry

associates in the United States [Kempton, Boster and Hartley 1995]. This allows us to compare and contrast the environmental consciousness of an admittedly limited sample of Japanese with those of people in the United States. Both countries are advanced both economically and in their history of environmental management, but have quite different senses of national identity and spiritual expression. We chose dioxin as a key issue for inquiry, since it was much in the news at the time and, like global climate change used by Kempton *et al.*, is complex, not directly observable, and not well understood, even by scientists. This makes it more likely that people will rely on the mental and cultural models they use for processing and making sense of other kinds of uncertain or ambiguous information.

We begin by offering interviewees' views on the relationship between people and nature or the environment. We then turn to their perceptions of environmental problems in general. We follow this by examining respondents' knowledge and views on the dioxin issue. Finally, we discuss the implications of our findings and areas for further study, in particular a closer assessment of the frequently mythologized relationship between religion, spirituality and environmental consciousness.

I The Relationship between People and Nature

In this section we examine our respondents' idealized views of the relationship between people and nature and follow that with a discussion of how they see that relationship in actuality.

I-1 *What Is the Relationship between People and Nature? What Should It Be?*

Kempton *et al.* began their study with the intent to focus on cultural models of global warming. They found, however, that these were embedded in broader cultural models regarding the relationship of people with the environment (ecosystem). They summarize these models for Americans as falling into three sometimes contradictory broad categories: (1) Humans are part of the environment, which is limited, and depend on it. Wastes enter cycles that bring them back to us; (2) Nature is interlinked ("balanced"), with unpredictable chain reactions from one fragile part to another, making it advisable for humans to refrain from interfering in it; and (3) Modern lifestyles, materialistic and market driven, devalue nature, while people are alienated from nature because they lack contact with it, unlike more primitive peoples and earlier times. In some ways, these categories are contradictory—how can people be part of nature but refrain from interfering in it?—but there is no need for logical consistency in people's perceptions.

By and large, at this level, the cultural models of our Japanese respondents appear to be quite similar to those of Kempton's sample. Indeed, the similarities would appear to be

far greater than the differences, especially for the first and third categories. There may be some significant differences in the second category, however.

Humans as a part of the environment. Mr. Nohara, a student, sees humans as being very much part of nature: “People are a part of nature. We cannot cut people off from nature.” Ms. Iwasaki evinces a cultural model of interdependent nature: “In the end, it will come back to us. [Environmental protection] is for our own sake.”¹⁾

Yet Mr. Watanabe, a 57-year old dry cleaner, sees human activity as being separate from the environment. He feels that “even though we are not in the environment, humans should preserve the environment.” It should be noted that “nature” and the (natural) “environment” are often conflated in people’s discussions, although many “environmental” problems, such as pollution, are actually primarily between people. This confusion may be one reason why there is a difference in apparent views over whether or not people are a part of nature/the environment.

For Ms. Mizuno, a 37-year old housewife, people and nature are *equal*. But, according to her, we should “have a reverence for nature” like we do for our parents. This kind of parent-child “equality” is reflected in other responses, that see the proper relationship between people and nature as *reciprocal*, but one-sided in practice, with people taking from nature. For example, according to Mr. Minamoto, the director of environment and safety for a major corporation: “Nature gives to humans mental and physical/scientific benefits. Humans must do things for nature such as protect rainforests...” Yet in practice: “Humans are always receiving things from nature but not giving anything in return.” Mr. Watanabe sees the ideal as one where we rely on nature and give it a helping hand.

Nature as interlinked and unpredictable. Our respondents did not often resort to this set of cultural models, indicating a possible difference in perception from their American counterparts that we will explore further in the concluding section. Mrs. Yamamoto, a 64-year old grocer who grew up in remote Ishikawa Prefecture, cautions that we should leave nature alone, even at the cost of progress: “What is the scariest is that as new things come in they will destroy nature.”

Modern lifestyles as alienating from nature. Mr. Minamoto uses an example from his childhood:

When I was a child, my mother told me that I must eat up everything on my plate. If I had a fish on my plate, I should eat the whole fish, so the fish would be happy. I suppose this is Buddhist thinking, or maybe Japanese? We must give something to nature in return for what we receive.

Mr. Minamoto’s example alludes to the possibly shared culture-specific constructs of

1) We have used pseudonyms to identify our respondents to protect their privacy.

mottainai (wastefulness/defilement) and *ongaeshi* (gratitude/repayment of a favor). We will come back to these as well in the conclusion. Here we focus on the avoidance of waste.

Mentioned prominently as an example of consumer waste is packaging—Japan is known for having a wrapping-obsessed culture, especially in consumer goods but also in areas such as the presentation of gifts and symbolic layers of meaning [Hendry 1995; Ben-Ari *et al.* 1992]. To cite Mr. Minamoto once again:

We need to change our lifestyle. In Japanese supermarkets everything is wrapped in plastic and styrofoam and is prewrapped. In the US they sell produce by weight and put groceries in paper bags. In Japan the plastic wrapping improves the appearance but increases waste. I hate the wrapping. It's a terrible habit. America is better. Japanese consumers need to change their habits but their consciousness is low.

Here, at least for rhetorical purposes, America is presented as an idealized other. This may come as a surprise to those who are aware that total municipal solid waste (MSW) per capita is quite low in Japan compared to other OECD countries, and certainly compared to the United States. The source of concern may not be with comparative quantities of solid waste, however, as the belief that Japan is a small (*semai*), crowded land. In addition, plastic is an epitome of an unnatural material, and is associated with dioxin production when incinerated.

Aside from avoidance of waste, the aspect of Mr. Minamoto's tale of the fish that others evidently share is not religious faith, which is almost never mentioned explicitly by our respondents, but a nostalgia for a life of their youth where, at least in their memories, the impact of human activities on nature was more benign. A similar nostalgia for the less wasteful past is expressed by 71-year old Mr. Yoshida, who bemoans both increases in population (not a major problem in recent Japanese history) and the wastefulness of a luxury lifestyle, exemplified by "people throwing out electric appliances rather than repairing them, because repair fees are so expensive."

I-2 *How Do People Relate to Nature in Reality?*

Ms. Yamada complains that "people seem not to care how they dispose of their wastes," not separating them into burnable and non-burnable in Tokyo, as they are supposed to:

The new generation, such as my niece and nephew, has had educational lectures. Still, people seem not to care how they dispose of their wastes. It's not a big effort but some people don't want to do it. Now in Tokyo everyone has to separate their waste into burnable and non-burnable materials.

The alienation theme is raised by Professor Iwakuni, but with an interesting twist.

He implies that nature represents a kind of ideal state that contrasts with our everyday realities:

There is a big difference between how we actually are and how we would like to be. People have dreams of doing things like working in a home office in the middle of the forest.

II Perceptions of Environmental Problems

In this section we explore the extent to which our respondents say that they are concerned about the environment, assess the depth of that concern, identify who they feel is responsible for causing environmental problems, look at their sources of information about the environment, and examine the reasons they give for why the environment should be protected.

II-1 *Are People Concerned about the Environment?*

As is the case elsewhere [Dunlap 1995: 63–114], opinion polls in Japan indicate that concern over the environment is widespread but not deep (“salient”). We found indications that this is true for a significant proportion of our respondents as well.

Most informants express concern over the environment, although a significant number indicate that they are not intensively concerned: “not particularly” (Mr. Watanabe) and “not so much, but a little” (Ms. Iwasaki) being typical responses. Ms. Iwasaki, a 25-year old unemployed M. A., goes the farthest: “Is it ok if I say I’m not [concerned]?” Of course, such a denial of concern may be a way of protecting oneself against being expected to sound informed. In many cases, the respondent went on to discuss in detail certain environmental concerns. Such responses may also indicate that “the environment” and “environmental problems” are placed in different mental compartments. Mr. Watanabe, a dry cleaner and a middle-school graduate who answered “not particularly” about his concern for the environment, is wary of the solvents he works with day in and day out.

II-2 *What Do People Mean When They Say They Are Concerned about the Environment?*

One reason for the lack of salience compared to other critical issues, and for the compartmentalization, is that the environment is not as well defined or unambiguous as, say, the economy, education, crime or immigration. When asked for a specific problem of concern, people respond with a great diversity of answers. Ms. Yamada, who also says she is not concerned in general, raises a lot of specific problems of concern: waste disposal, children’s allergies, the ozone hole, and recycling of PET (Polyethylene Terephthalate) bottles. Ms. Yamamoto begins by associating the environment with very global issues, but when asked to identify a specific problem, she brings up the need to separate

the trash.²⁾

The propensity of the business world to engage in strategic planning shows in the answers of two of our respondents with corporate experience. Mr. Minamoto sees latent hazards that “have the potential to become a big problem” and Ms. Yamada, a tax accountant, looks at the potential for a catastrophe, alluding to the uncertain quality of the “effects” of “an environmental disaster.” Mr. Minamoto, Ms. Yamada and Mr. Yoshida, all present or past corporate employees, raise the question of cost, as does Ms. Mizuno, a housewife (and, if typical Japanese, therefore the household CFO).

The ozone hole, as the first well publicized global issue, seems to have become the most emblematic environmental problem for many, and is raised voluntarily by a number of respondents in Japan (as in Hong Kong and the United States). Ms. Yamamoto, our grocer, expresses alarm that the air is running out of oxygen due to ozone depletion. While this response is not scientifically “accurate,” it does indicate a linking of global problems to her own living environment in a kind of synthesis that Kempton *et al.* found among American lay cultural models. In contrast, Ms. Yamada, our corporate tax accountant, volunteers concern over ozone depletion but opines that it is someone else’s problem, notably that of light skinned people who she sees as having a skin that is more vulnerable. In this she agrees with dominant scientific thinking, but only to a degree. Other posited effects of ozone depletion, such as increased incidence of cataracts, immune system disorders, damage to crop species and destruction of phytoplankton at the bottom of the aquatic food chain, are not related to skin pigmentation [Litfin 1994: 56–58; Leaf 1993].

II-3 *Who Is Responsible for the Environment?*

Respondents place the locus of responsibility for dealing with the environment in different places. Ms. Yamamoto discusses what ordinary people can do about the environment. Ms. Shima, a 33-year old businesswoman, points without elaboration to deficiencies in the consciousness of ordinary citizens, as do Ms. Mizuno and Ms. Nagano. Ms. Sawa, a 26-year old Ph. D. student, sees the political system as the biggest problem. Mr. Watanabe puts the onus of environmental problems on the government and nation rather than on individuals. Ms. Yamagata, a pregnant woman, notes the lack of cooperation between the state and individuals.

Ms. Yamada, who complained about people’s not separating wastes, does not put the

2) A possible interviewing bias in respondents’ selection of specific issues should be noted. Since many of them had prior knowledge that the interview would address dioxin, they may have raised those problems that seemed to them most germane to that topic: separation of plastics from the waste stream and health problems that may have to do with endocrinal disruptions. Nonetheless, most people offered a broader range of environmental problems as of concern to them, indicating that this bias is probably not strong if it exists at all.

blame entirely on the consumer:

Some people do not follow these simple rules. It is a problem. Some people do not understand how to separate their trash. The manufacturer of the packaging should label them for proper disposal.

It is common for respondents to exonerate others in civil society, especially by indicating that they have not been provided proper education by government or business. In a Confucian society, it is the government's responsibility to provide moral guidance and education to the ordinary people.

II-4 *Where Do People Obtain Information and Attitudes about the Environment?*

Do They Trust These Sources?

Most respondents indicate they receive their information from the media, notably television and newspapers. Mr. Watanabe also mentions radio. Mr. Minamoto and Ms. Nagano indicate they received some information from seminars and symposia. By and large, respondents seem to have a high level of trust in the media. At one extreme is Ms. Yamamoto the grocer:

Don't we have to believe them? They say the same thing in other countries. They say it in Japan too. We copy the world.

At the other extreme are Mr. Kita ("People put too much faith in the media.") and Mr. Minamoto:

I only watch television for fun, but I found a lecture by a EU [European Union] advisor to be very interesting. Japanese television mass media tend to be very emotional, and this is a problem when ordinary people watch it. We need to stay cool-headed when we hear these things.

Mr. Asahi, 30, once worked in a life insurance company supervising its saleswomen. He feels that his supervisees made too big a deal about the dioxin incident in Tokorozawa that was extensively covered on television. Ms. Nagano, a graduate student, notes that she is influenced by the environmental concerns that excite the people she is around—in her case, dioxin and energy.

Given the bias in our sample towards those with some interest or expertise in environmental issues, especially among the experts, it is not surprising that many informants also note lectures, discussions with colleagues, and professional journals as sources of information, especially on dioxin.

Related to the sources where people receive information on environmental problems

is how their interest was sparked in the first place. Some people's interest in the environment stems from experiences as a child, especially excursions into the countryside to gather mushrooms or other flora and fauna of the wild. Some, especially the young, learn about the environment in school, although few of our respondents point to this as the source of their environmental consciousness. Mrs. Yamagata says she learned about global warming from a foreign teacher in an English class. She is currently pregnant, but says that nonetheless she only has vague concerns about environmental problems.

Mr. Minamoto claims to have first become interested in the environment when he was given the job of environmental director of his company. Similarly, Ms. Murakami, a farmer in her 60s, indicates a customer-driven interest in organic farming.

II-5 *Why Should We Protect the Environment?*

Kempton *et al.* [1995: 87 ff.] found that Americans' environmental values stem from a mix of three sources: religion; *anthropocentric* (human-centered) values, especially concern over future generations; and *biocentric* values, especially the intrinsic rights of nature, such as the right of species to continue to exist.

We did not find a similar reference to religion as a common source of environmental values in Japan. Anthropocentric arguments dominated. In particular, as in the United States, concern for the environment was linked strongly with a feeling of responsibility towards future generations, especially but not exclusively among women. Pregnant women such as Ms. Yamagata and recent mothers are particularly concerned about pollutants such as dioxin in human breast milk. She also states that "we have to protect [the environment] for everyone's survival from here on out." Ms. Mizuno expresses concern specifically over future generations.

Many expressions of concern for future generations were not presented in entirely altruistic terms. According to Ms. Shima, we should stop global warming "for our own health... and also for the sake of future generations." Ms. Yamamoto lists one's own personal life alongside that of one's grandchildren. Mr. Watanabe concurs both regarding future generations and present benefits.

Mr. Minamoto has a very complex view of the environment, and of human behavior. He stresses the disconnection between what we know we should do and what we are really concerned about. For example, although he has a good understanding and apparent concern over long-term effects—one of the few to associate dioxin with long-term ecological disruption—he also admits to a personal bias towards the present, the short-run, and his own personal environment. He opines that this short-sightedness is a national characteristic, in contrast to Europeans, who, in his idealized view, "think in the long-term, many generations ahead."

Mr. Nohara and Ms. Nagano, both 24-year old students, are *utilitarian*: for our own sake. Ms. Nagano, a student, pulls biocentric and anthropocentric arguments together,

linking our fates to those of the entire globe: "For the sake of the earth as a whole, including ourselves."

Mr. Minamoto emphasizes restoration of a past clean environment, but does not directly say why. Ms. Yamada, a tax accountant, uses an *aesthetic argument*: "There is an emotional need to protect nature, and to enjoy benefits such as clean air and water." But she is pessimistic about the possibilities of satisfying this need, because convenience is more compelling:

For example, chemical detergents destroy water. This is one reason for Japan's poor water system, but they are quick-acting and remove oils and stains, unlike ordinary soap. Faster is better.

Perhaps more than in the United States, "emotional" is a loaded, nearly pejorative term in Japan, used especially by government officials and businesspeople to indicate a lack of clearheaded rationality. For Mr. Minamoto, science is more likely to support rational decision making, and profitability, than "emotional" activists such as Greenpeace or local NIMBY activists, or "emotional" press reports. Ms. Yamada and Mr. Minamoto, both presumably reflecting Japanese corporate culture, use the word "emotional" where an American counterpart would be more likely to use a term such as "alarmist." This choice of terms probably reflects deeper cultural assumptions, but there is no space to explore this in depth here.

Environmental lawyers have suggested that a *biocentric* perspective be brought into the legal system by according defensible rights, or standing, to nature or the environment. The controversial Endangered Species Act of the United States is an exemplar of this kind of law. In response to an example of the reclamation of two of Japan's few remaining tidelands, Isahaya Bay and Fujimae, used to illustrate situations where one might consider whether nature has separate rights, Ms. Yamada opines that environmental rights would be a useful way to stop "construction in foolish places." Her arguments are primarily economic, however, although phrased in terms of intergenerational equity: "It is important to look at the long-term costs of a project that would affect future generations." These might "outweigh its current value."

Mr. Yoshida, a retired banker and now graduate student, explicitly rules out biocentrism:

The increase in population is destroying the environment. Yes [we should preserve the environment] because of other people. No, not for the sake of the environment. Yes, for future people.

III Perceptions of Dioxin

We chose to use dioxin as a focal problem in our interviews. Dioxin is likely to be more salient than the environment in general, yet it is an issue domain where our relatively verifiable knowledge remains limited. Hence, it should be a good means of probing mental and cultural models. Even scientists often have a poor understanding of the sources, pathways, and health effects of dioxins. Policies to address the real or perceived dioxin problem in Japan involve modification of incineration policies that in turn have resulted from the waste disposal problems of a high material lifestyle in a country with few viable disposal alternatives.

Dioxins are an unintentional by-product of combustion, the manufacturing of some chemicals (such as some pesticides that are no longer used), some bleaching of paper, some industrial processes involving chlorine and other halogens, and perhaps forest fires [Powell 1997: 1]. In Japan, the principal source of new dioxin emissions is incineration, particularly of municipal solid wastes (MSW) (*gomi*), with wide variations depending on factors such as technology employed, feedstock (especially, the chlorine content of products such as certain plastics), temperature of incineration, and operating rules (dioxins tend to be produced more during power-up and power-down, favoring 24-hour incineration).

Scientists count as “dioxin” the 75 “congener” chemicals in the PCDD (“dioxin” proper) family, the 135 congeners in the PCDF (“furan”) family, and increasingly (but not always), even the 209 congeners in the PCB family, because of their apparent similarity in acting on the Ah receptor. Of these, only 7 PCDDs, 12 PCDFs and 12 PCBs are believed to be at all toxic, and most are several orders of magnitude less toxic than 2,3,7,8-TCDD. On the other hand, many of them are far more abundant than 2,3,7,8-TCDD. Scientists use a “toxic equivalency factor” (TEQ) to convert the various congeners’ toxicity to 2,3,7,8-TCDD equivalencies. This lumping together makes sense at a practical level in terms of toxicology and policy-making (e. g., standard setting), but does mean that the chemical that was found to be the “most toxic” in tests of over two decades ago usually constitutes a very small, sometimes negligible, portion of the dioxin cocktail.

In Japan, most exposure to dioxins comes from eating—primarily fish, shellfish, secondarily fatty meats and dairy products. Breastfeeding is a relatively high-concentration pathway to a particularly vulnerable population, especially to the extent that dioxins affect the endocrines of infants (through the Ah receptor). Ironically, limited but consistent time-series data from a number of industrialized countries indicate that the dioxin content of breast milk has been declining significantly for over a decade, even in Japan. The reasons for this are not entirely clear, but may indicate that certain herbicides used in the 1960s and early 1970s, notably 2,4,5-T, produced much greater loads

of dioxin in the environmental pathways than has incineration.

Dioxin exposure at high levels has been associated with a skin condition called chloracne. Some suspect it of being a culprit in an apparent rise in skin problems such as atopic dermatitis among children in Japan, especially those who are breast-fed. Studies to date indicate that any such effect is slight, and are probably outweighed by the immunological benefits of breastfeeding.

III-1 *What Do People Know about Dioxin and Its Effects?*

All of our respondents had heard of dioxin, but the level of knowledge of its reputed effects varied widely, both within elite and lay groups of respondents. Time referents span over three decades: Mr. Watanabe, a 57-year old dry cleaner, associates it with defoliants in the Vietnam War, while Ms. Nagano, age 24, citing its concentration in breast milk, relates it to current problems in Tokorozawa, the site of a cluster of relatively unregulated industrial incinerators. Responses, at least in this instance, reflect both age and gender differences.

Most respondents mention incineration and/or solid wastes. Mr. Nohara is unusual in mentioning solid wastes without explicit reference to incineration, stating that dioxins are produced by a "chemical reaction of solid wastes."

Most respondents, both elites and lay, noted that dioxins affect people's bodies in some way. Ms. Yamagata goes a step further and says "They make you sick" but could not be more specific than that, even when pressed. Mr. Yoshida, a retired banker, claims that all he knows is "that they remain in the body." Lay people such as Mr. Asahi and Mr. Watanabe also mention bioaccumulation. Like many others, especially lay people, Mr. Watanabe also specifically refers to birth defects.

Despite its reputation as a powerful carcinogen, few people name cancer as a possible health effect of dioxin, even though this effect is often mentioned in the press. This may be due to a lingering cultural reluctance to discuss cancer, but it also seems that it is the effect on future generations via birth defects and genetic damage that is of the greater concern to most respondents. In this regard they concur with scientists.

Ms. Yamada refers to a very specific synergistic effect that appears rarely if at all in the scientific literature:

I read in an article somewhere that a combination of dioxin and cadmium may cause problems. It is not visible at first, but I read that cadmium can destroy the organization of the nervous system. It can cause numbness. I have read some alarming articles about this. Perhaps they are too emotional.

It is interesting that of all the possible health problems that can be attributed to dioxin, Ms. Yamada chose one that is relatively improbable. Perhaps this is because the cadmium poisoning (Itai-Itai) was in one of the Four Big Pollution Cases of the early

1970s that are part of the shared historical narrative of most Japanese.

Ms. Yamamoto, a grocer, is one of the few to associate dioxin with environmental destruction aside from health effects, but then incorrectly (that it decreases the level of oxygen in the air) and without apparent consideration of nonhuman ecological effects. Kempton *et al.* also found a linkage of environmental problems, in their case, greenhouse gases, to concerns over depletion of atmospheric oxygen. In that case the mechanism (disruption of photosynthesis and hence the carbon cycle) was scientifically correct but of minor significance compared to climate change.

III-2 *What Causes Dioxins to Be Produced?*

Some aver that they know little specific about dioxins, except, for example, that they are bad for human health (Ms. Yamagata). Ms. Yamagata further associates dioxin production with industrial wastes (a locally important source when incinerated, but probably not so significant in the aggregate). Ms. Iwasaki knows from television that tea leaves in Saitama Prefecture had high levels of dioxin.

Others are better informed about detailed characteristics. Professor Takeuchi points to the high toxicity of dioxins and their persistence (they take a long time to break down). Mr. Kawate notes that they are unintentional by-products of production and incineration, highly toxic, with chronic toxicity and genetic effects on future generations (the genetic effects are considered likely but not proven by scientists). Mr. Kita notes that the probability of birth defects is higher in the vicinity of incinerators. Most informants, even those who are relatively well informed, appear to associate exposure with proximity to incinerators. Actually, for most people, dioxin exposure comes through the food chain, not location.

Professor Iwakuni, an environmental expert, opines that the largest source of dioxins in Japan is herbicides, followed by incinerators, with burning outside of incinerators (such as building fires) third. In the 1970s, this was true, and much residual dioxin found in sediment is from herbicides, but these days incineration is a far more significant source.

III-3 *Do Dioxins Affect You Personally or Your Work?*

Some of the best-informed respondents (e. g., Prof. Iwakuni, Prof. Takeuchi, Mr. Kawate, and Ms. Iwasaki) opine, probably accurately, either that dioxins do not actually affect their own health or only do so to a small degree. Others (e. g., Ms. Shima, Mr. Kita, Ms. Sawa and Mr. Waki) claim that dioxins are not of great concern to them at present, at the same time confessing a lack of knowledge or awareness. Expressing greater concern in the face of present uncertainty, Ms. Yamagata, who is pregnant, is concerned about the dioxin content of breast milk. Here her concerns are in line with the current state of scientific knowledge.

The most common answer is that dioxins likely have some (usually unspecified)

effect on them personally. Nonetheless, few are able to cite impacts on their workplace or work, aside from the two professors of environmental studies (citing it as a topic of academic concern) and Ms. Shima, a travel agent. An important consideration for a few is whether their home or workplace is located in a “clean place” (Mr. Minamoto) or where “there are no incinerators (or nuclear power plants) nearby” (Mr. Yoshida). This latter indicates a disjuncture between the perceptions, even of elite respondents, and those of scientists regarding exposure pathways. Mr. Sato, in his 20s, notes that he is “very worried about vegetables,” a concern that current data would indicate is misplaced, with a few possible exceptions such as spinach, which has a total dioxin concentration comparable to that of chicken (but lower than beef, higher than pork) [Miyata 1999: 22–24].

III–4 *Are Others Concerned and Well-Informed?*

Ms. Yamada relates dioxins to pollen allergies (probably due to other causes) and atopic dermatitis that are of concern to her co-workers:

I am not sure whether dioxin affects me personally although I sometimes feel allergies from food and have itchy eyes. Many people have hay fever and increasing problems with pollen these days. I wonder why, because when I was young I never heard about this. Also many of my friends' children have atopy (atopic dermatitis), a kind of itchy skin rash that is believed to be caused by food allergy and other things. Some working mothers in my company who I talk to often complain of this problem. It can even kill children.

In general, respondents report that dioxins are only a subject of office conversations when they are related to work. Ms. Sawa says that when dioxin is in the news, people talk about it. Mr. Minamoto notes that people talk about dioxins a lot at his workplace, because they are an object of work, but they do not express any opinions about them. He says his family is “very nervous,” however. Similarly, Mr. Kawate claims it is his wife who is most concerned. Mr. Yoshida, who is studying chemistry and was given a copy of the protocol in advance, notes that the perception of his workmates was that others have the wrong idea about dioxin, but the difference seems largely semantic:

I asked my laboratory colleagues. No one knew any details. Dioxin has a bad name. It's a problem of chlorine, but people don't think of this when they think of dioxin.

Mr. Kawate notes the fixation people appear to have on the most toxic form of dioxin, 2,3,7,8–TCDD:

Dioxins are often described as the most toxic substance. People mistakenly think all of the over 200 types of dioxin are as potent as 2,3,7,8–TCDD.

Ms. Yamada has a cultural explanation for why she does not hear more about dioxin (or other serious topics) at work:

There is not a lot of talk among people I know about the dioxin problem. This may be because many people do not like to talk about serious topics so much. I have time for conversations at lunch for example, but Japanese don't like to talk about serious topics at lunch.

Speaking for himself, Mr. Yoshida reiterates the view that ordinary people are in the dark, responding to uninformed fears:

People don't know about dioxin, they just fear it because it is a bad word, like the atomic bomb.

Prof. Iwakuni directs his criticism at groups in opposition to MSW (municipal solid waste) and "environmental hormones" (endocrine disruptors):

They don't draw a clear line between what they understand and what they do not. They operate on fear.

Mr. Kita and Ms. Iwasaki claim that they themselves no doubt have the wrong idea. Mr. Kita uses that to substantiate a supposition that others must have wrong ideas too (but without giving specifics). Ms. Iwasaki says her probable misunderstandings stem from her "passive temperament."

III-5 *What Policies Should Be Adopted to Address the Dioxin Problem?*

We presented five proposals for consideration, focusing on different levels and modes of action: (1) acceptance and adaptation; (2) waiting for conclusive research findings before acting; (3) modifying personal behavior to avoid exposure; (4) adopting possibly costly regulation; and (5) changing lifestyles. Lay people are more likely than the experts to offer an opinion about actions to address the dioxin problem. Most commonly, respondents propose that solid waste streams need to be reduced. Excess packaging is frequently cited as an example of present wastefulness.

The first proposal. *Accept dioxin as a necessary evil.* This "hard realistic" proposal received no support from any respondent: "That's nuts!" (Ms. Nagano, student)

The second proposal. *Research first, then take action.* This also received no support.

The third proposal. *Reduce exposure by eating less fish and meat.* There was little support for taking personal defensive action to this degree. Some representative views:

It is not reasonable to stop eating fish and meat even though they contain dioxin, which is potentially harmful. (Ms. Yamada, tax accountant)

Some may be of that opinion, but personally I don't think I could do it. (Ms. Yamagata)

No way I can agree with that. If you are really afraid of dioxin, you might give up fish and meat, but you also get nutrients from fish and meat to build up your body. (Ms. Shima)

That's a personal matter. (Ms. Iwasaki)

If you want to eat poisonous food, that's your business. So I don't think it's necessary to make any special efforts on an individual basis. It's a personal matter and should not become a policy slogan. (Prof. Takeuchi)

Mr. Kita notes that attention should be paid to where the fish and meat are from. In this, he agrees with the experts, who see a wide variation in dioxin content depending on factors such as fat content, where the fish was caught, and what the animal ate.

Ms. Sawa and Mr. Waki point to the adverse effects implementing such a proposal would have on employment of fishermen and middlemen. Thus, according to them, any policy should tread lightly. It is difficult to ascertain whether their views are purely pragmatic or whether they reflect a kind of empathy towards others' livelihoods. It is also unclear how widespread this kind of concern is among Japanese respondents, but this would be a good area to explore in subsequent studies, as it may reflect a cultural difference.

The fourth proposal. Strictly regulate dioxin emissions even if it means closing incinerators at great cost. Nearly all support this proposal, although with little elaboration.

The fifth proposal. Stop incinerating trash, reduce trash, increase recycling, even if it requires lifestyle changes and higher taxes and prices. This receives broad support, but with a wide variety of comments and elaborations. Ms. Yamamoto: "The government should do that." Mr. Watanabe: "That's a no-brainer." Mr. Yoshida: "The idea is very good but at present it is impossible." Ms. Nagano: "No choice; I approve." Many others respond with the same words as Ms. Nagano that "We don't have a choice." As noted previously, Mr. Minamoto focuses on cutting back on plastic wrapping in supermarkets.

Ms. Yamada has a relatively nuanced response:

Personally, I try to buy products that can be recycled, like drinks in paper containers. This is sometimes difficult for me, and is even more troublesome for mothers who have many children. I can accept an increase in price if it helps reduce pollution. Of course I would expect the company to cut costs within first.

Ms. Yamamoto cites vinyl products, but expresses concern over the livelihood of those who produce them if action were taken on vinyl.

Most talk in terms of taking action to improve emission sources (such as incinerating equipment) without assigning responsibility for action. A few respondents suggest that it is up to government, especially local governments, to address the dioxin problem. They see a problem in so doing, however, because of strapped local budgets or problems of bureaucracy or politics. Mr. Kawate points to the "quality of bureau-

crats,” in particular their reluctance to take risks. Ms. Sawa sees the problem as systemic, originating with government administration and profit-seeking business sector, but also involving those households who operate small incinerators. No matter what the source of the problem, Ms. Sawa sees the solution as necessitating counteraction at an individual level, through reducing the solid waste stream. Mr. Kita notes that MSW is the “raw material” for dioxin in incineration, and should be reduced. At an abstract level, at least, these two respondents see the problem as being one of material lifestyle, which can be corrected through individual action. Ms. Yamagata points to recycling as a solution, one with more ambiguous loci of responsibility and intervention.

Additional proposals. A few respond with a specific proposal. Mr. Minamoto proposes that freedom of information would make a big difference. Mr. Watanabe indicates that the individual does not know enough, so it is necessary to rely on specialists. Ms. Nagano, a student, suggests consciousness-raising at the individual level. Ms. Shima proposes childhood education. Prof. Iwakuni calls for removing conservative members of parliament who are too close to industry. Other than that, he suggests adopting a deposit-refund system. Mr. Kawate proposes a “radioactive waste” model, where potentially dioxin-producing wastes would be stored until technical progress would allow for proper disposal.

III-6 *How Does Dioxin Compare to Other Risks?*

We asked respondents to compare their level of concern between dioxin and five very different types of other “risks”: tobacco smoke (either direct or second-hand), earthquakes, global warming, traffic accidents and the state of (and prospects for) the Japanese economy (Table 2, for 22 respondents). For the most part, we found respondents quite capable of risk reasoning using arguments that fall into standard risk trait categories, such as familiarity, personal control, voluntariness, impact on future generations, level of current understanding, and immediacy of adverse effects [Kuran and Sunstein, 1999].

Table 2 Risk Comparisons by Respondents: “Which Are You More Concerned about?”

	Number		Number
<i>Tobacco</i>	11	<i>Traffic</i>	14
Dioxin	7	Dioxin	7
Same/other	4	Same/other	1
<i>Earthquake</i>	11	<i>Economy</i>	15
Dioxin	7	Dioxin	3
Same/other	4	Same/other	4
<i>Global warming</i>	3		
Dioxin	9		
Same/other	10		

In particular, we found that only global warming was considered less risky than dioxin, and even then a significant number of respondents considered these two remote and “invisible” risks to be of comparable magnitudes. This validates our intuition that our local issue is a good basis for comparison with the study of Kempton *et al.* Concerns over more immediate risks such as traffic accidents and the Japanese economy were far greater than over dioxin.

Concern over smoking and earthquakes was only slightly greater than that over dioxin, although in the case of earthquakes there appears to be a gender difference. Eight of our 13 males were more concerned about earthquakes, while only one picked dioxin. The proportion was reversed for our female respondents: 6 picked dioxin, only 3 chose earthquakes. Ironically, both genders used efficacy arguments, but with different interpretations. As a whole, males picked earthquakes because of the inability to protect oneself; females who picked dioxin did so because it is possible to do something about it. Given the size of the sample, we cannot make too much of this difference, but it bears further exploration.

IV Discussion and Areas for Further Exploration

Although we sought to interview a broad spectrum of people in the Tokyo area, the total number of interviews we were able to do was quite limited, and our questions, although open-ended, were not often answered in great depth. To enhance our confidence in our interpretations of this limited set of data, we used a number of null hypotheses. In most cases, we found few definitive conclusions, but some indications of areas for possible future explorations of Japanese environmental consciousness, in particular the role of religion.

Hypothesis 1. Actually, the environment is a universal, contemporary discourse that is widely shared, and the Japanese are no different than anyone else in their attitudes.

By and large, we agree with this hypothesis. As noted, the cultural models of the environment held by our Japanese respondents appear to be more similar to than different from those Americans studied by Kempton *et al.* This appears to be true in our Hong Kong, Thai, and Vietnamese studies as well. One possible explanation for this is that environmental discourse, having developed almost in step with the spread of international mass communication, transcends national boundaries, and constitutes a break with traditional cultural models held nearly everywhere, including the United States and Japan. For example, “protecting” or “preserving” nature in the sense of ecosystems is largely a contemporary concern. Another possibility is that all use a common language, but with different connotations. Given the common view that the national cultures of the two populations are different in many fundamental ways, this is

an area that bears further investigation.³⁾ At the same time, we would like to raise a few areas where we see some differences, in particular, in the way some characteristics of Japanese culture may provide a different frame for the way our respondents approach environmental problems.

Hypothesis 2. Feelings of political and social efficacy (or lack of it) explain much of the difference between Japanese cultural models on the environment and those of Americans.

We also agree with this hypothesis, and feel it applies to other Asian cases in this study as well, although perhaps expressed in different ways. In particular, Japanese “lack a sense of a precautionary principle” at an individual level because of a feeling of powerlessness to take precautionary action. This is particularly true of the older generation whose attitudes were formed in a society driven by an obsession with material progress, evidenced most clearly in the period of rapid economic growth in the 1960s and 1970s. The precautionary principle is becoming more politically correct in Japan, and is increasingly reflected in the decision-making processes of local governments, as reflected in the recent suspension of development projects, such as the reclamation of the Fujimae and Sambanse tidal lands or the construction of power plants of various kinds (not just nuclear). At the same time, the prolonged economic and political stagnation of the 1990s may have reinforced a sense of powerlessness in the younger generation as well. One area where people do not feel so powerless is against nature.

Hypothesis 3. More than others, Japanese operate with “double codes.”

We do not find this commonly stated hypothesis particularly compelling in our sample. Certainly, the idea that people, individually and as a species, say one thing and do another is strong in many responses. This may relate to a common perception among Japanese that people have a “front” (*omote*) side that observes social proprieties (such as expressing concern over the environment) and a less proper “back” (*ura*) side that is how they actually feel and, if they can, act. A number of other similar “double codes” are legitimated by dominant discourse, including *tatema* (socially or politically correct) and *honne* (hidden, authentic, personally desirable sentiment) and *soto* (outside/r) and *uchi* (inside/r) [Sugimoto 1997: 25–26].

Some of our respondents make a statement of what they consider the socially proper thing to say, but follow it with a statement declaring a different, more “selfish” personal reality for themselves or others. This appears to be in contrast with the typical presentation by the Hong Kong respondents that they themselves are more concerned about the environment than are others. Nonetheless, while our respondents may use a

3) Another approach is to review the ways that social scientific approaches, largely developed in the West, may have “exoticised” Japanese culture. An interesting exploration of this theme is Kreiner and Ölschlager [1996].

double coded rhetorical framework, an equally compelling explanation is that they are expressing a frank awareness of the well-known disjuncture between what is good for society and what is good for the individual that underlies environmental concerns everywhere.

Hypothesis 4. Japanese see nature in direct, reciprocal, social terms.

According to this hypothesis, the idea of a relatively circuitous, indirect "balance" of nature or ecosystem concept would occur less frequently than in the US. This hypothesis assumes that the reciprocal nature of gift-giving and repaying favors that permeates Japanese social order is reflected in attitudes towards nature. Traditional folk tales (most famously, *Tsuru no Ongaeshi*), often deal with shape-shifting animals such as cranes who assume a human guise to return favors bestowed on them by kind people. These tales in turn are related to Buddhist ideas of reincarnation, or metempsychosis, which recognizes a porous post-mortem border between human and non-human souls.

There does seem to be a difference between Japanese and American respondents in the appropriate cultural model to use in negotiating the relationship between people and nature. A hierarchical relationship appears to be felt more strongly by Americans, whether they support hegemony of people over nature or stewardship. The Japanese, who have a highly refined sense of relative status in social relations, are more likely to see nature as at an equal or even superior level to people, deserving respect but not always receiving it.

In practice, we found that respondents do frequently use the word "balance" (*ba-ransu*), using the linguistic variant that is imported from English. At the same time, they refer to "harmony" (*chowa*) with nature, a concept that originated with Buddhism, and appears to be a bit more "Japanese." As noted, we did not find as strong a belief in the irretrievable precautionary principle as in the American sample.

A traditional value in Japanese culture, as in most other cultures before the rise of modern consumerism in the postwar era, is to avoid wastefulness. Mr. Minamoto (age 50) remembers his mother's admonition to eat the whole fish; Mr. Yoshida finds the inglorious dumping of electric appliances, the emblem of postwar consumerism, to be a clear example of wasteful behavior.

A key term that Japanese associate with wastefulness, *mottainai*, has religious origins and, possibly, continuing religious connotations. In particular, it means

- A defilement of the original value of something that has its own meaning, co-existent and co-equal with other things (from Buddhism), hence
- An admonition to minimize the take from nature but to maximize the utilization of goods derived from nature.

Hypothesis 5. Religious discourse does not explicitly enter into environmental consciousness.

At the same time, we found that our Japanese respondents, unlike their American counterparts but similar to most respondents in the other Asian countries we studied, almost never refer explicitly to religious bases for their environmental beliefs. The exceptions are the reference by Mr. Minamoto to the happy eaten fish, and, interestingly, a reference to the Christian concept of “original sin” by Dr. Kosugi, a scientist, in referring to the relationship between human activities and the environment.

We could think of two possible explanations for the lack of explicit reference to religious discourse. One is that Japanese do not see nature or the environment as having religious meaning. This does not ring true to the Japanese authors, as Japanese sometimes see a mountain (such as Mt. Fuji) as a religious place, occasionally enshrining it. Such beliefs are rooted in Shintoism, itself derived from animism, and is still very much alive in people's minds. Many Japanese houses continue to have a family altar (*kamidana*), which is Shinto, and dedicated to the land, and a Buddhist altar (*butsudan*), where one honors the spirits of the ancestors.

Possibly, the problem goes to the nature of religion and religious belief.⁴⁾ Unlike the monotheistic faiths (Christianity, Islam, and Judaism), Japanese religions are not “confessional” or “revealed,” seen as separate from secular life with a different vocabulary. Monotheism is more likely to require a declaration of obedience to a god or doctrine, and to seek to draw clear lines between true believers and others. Japanese “syncretism,” part Shinto, part Buddhist and part Confucian, may lead to religious or spiritual elements being assimilated into value systems without any felt compulsion to identify them as particularly religious.

At this point, this is still a quite untested hypothesis, as it requires us to interpret an absence of text rather than its presence. It is equally plausible, given the utter lack of evidence in our interviews that religious beliefs of any kind influence the way Japanese conceptualize their relations with the environment, that religious commitment does not run deep, or that it is somehow kept in a separate mental compartment. The relative relationship of religion, spirituality and environment is very complex, and apparently more hidden, in at least some Asian populations, and merits further investigation.

V Conclusion

Even in our limited study, we have found much that runs counter to common wisdom on environmental sensibilities in Japan. We found that the similarities in cultural models on the environment between our respondents and those of the Americans studied by

4) For a classical statement of the view that “religion” itself is a “western” concept, see Smith [1991].

Kempton *et al.* are much greater than the differences. In the case of dioxin, respondents are strongly influenced by the media (just as Americans), but are capable of making reasonable comparisons across risk categories. Perhaps the most significant differences from the American sample are in the Japanese view of unrequited reciprocity, where nature provides benefits to inadequately grateful people, and in the absence of explicit links to religious belief.

It is important to emphasize that Japanese respondents, like those elsewhere, do commonly express individual concerns over nature. Such concerns appear, however, to be suppressed by a sense of powerlessness to take effective action in an economic system that remains oriented towards development and a pervasive consumer culture that stresses convenience and presentation over essential and long-term relationships with the environment. Increasingly, there are signs that Japanese are asserting their concerns in a public decision making arena that embraces, at least rhetorically, the necessity for realizing a sustainable society. We hope that future surveys such as this will show an increasing sense among respondents that they can act to realize their environmental consciousness.

Acknowledgments

We are grateful to Kenji Amano, Ruth Eades, Hironari Koiwai, Rikuo Muramatsu and Lyn Wingert for assisting us in carrying out these interviews, to the Institute for Global Environmental Strategies (IGES) and the National Institute for Environmental Studies (NIES) for financial support, and, most of all, to our respondents, for generously sharing their time and views.

References

- Ben-Ari, Eyal; Moeran, Brian; and Valentine, James, eds. 1992. *Unwrapping Japan: Society and Culture in Anthropological Perspective*. Honolulu: University of Hawaii Press.
- Dunlap, Riley E. 1995. Public Opinion and Environmental Policy. In *Environmental Politics and Policy: Theories and Evidence*, edited by James P. Lester, pp. 63–114. Durham: Duke University Press.
- Hendry, Joy. 1995. *Wrapping Culture: Politeness, Presentation and Power in Japan and Other Societies*. Oxford: Clarendon Press.
- Kempton, Willett; Boster, James S.; and Hartley, Jennifer A. 1995. *Environmental Values in American Culture*. Cambridge, MA: MIT Press.
- Kreiner, Josef; and Ölschlager, Hans Dieter, eds. 1996. *Japanese Culture and Society: Models of Interpretation*. Monographien aus dem Deutschen Institut für Japanstudien der Philipp-Franz-von-Siebold-Stiftung, Band 12. Munich: Iudicium-Verlag.
- Kuran, Timur; and Sunstein, Cass R. 1999. Availability Cascades and Risk Regulation. *Stanford Law Review* 51: 683–768.
- Leaf, Alexander. 1993. Loss of Stratospheric Ozone and Health Effects of Increased Ultraviolet Radiation. In *Critical Condition: Human Health and Environment*, edited by Eric Chivian, Michael McCally, Howard Hu, and Andrew Haines. Cambridge, MA: MIT Press. Cited at <http://www.ciesin.org/TG/HH/ozeye.html>
- Litfin, Karen T. 1994. *Ozone Discourses*. New York: Columbia University Press.
- Miyata, Hideaki. 1999. *Daiokishin* [Dioxin]. Tokyo: Iwanami Shinsho.

- Powell, Mark R. 1997. *Control of Dioxins (and Other Organochlorines) from the Pulp and Paper Industry under the Clean Water Act and Lead in Soil at Superfund Mining Sites: Two Case Studies in EPA's Use of Science*. Discussion Paper 97-08 (revised). Washington, D. C.: Resources for the Future, May.
- Smith, Wilfred Cantwell. 1991. *The Meaning and End of Religion*. Minneapolis: Fortress Press.
- Sugimoto, Yoshio. 1997. *An Introduction to Japanese Society*. Cambridge, UK: Cambridge University Press.